



WASCO COAL STORAGE: A SERIES OF INVERTED CONICAL BUNKERS

Mining & minerals
Storage bunkers

United States, California, Wasco



Owner / Client :

Savage Coal Services Corporation

Engineer :

Twining Laboratories,
Incorporated

Main contractor :

Ultrasystems Engineering
Company

Terre Armée entity :

The Reinforced Earth Company
(United States)

Date :

1989

Activity :

Reinforced Earth

System :

Other

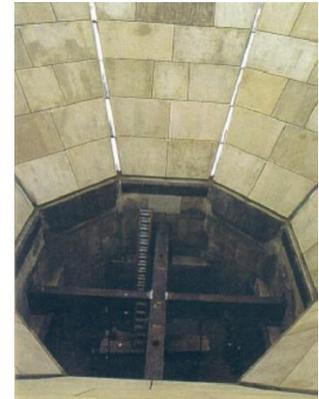
Reinforcement :

HA / HAR steel strips

Key figures :

Area : 2300 m²

Rise: 20 m



The Project

The project consists of four side-by-side inverted coal storage bunkers, each topped with a rigidly connected storage tank silo structure. Each inverted polygon hole measures 26m across and the depth of the holes vary from 17m and 20m. Two bunkers can store 11,000 tons and two can store 10,000 tons. The bunkers are independent of one another as each serves a particular customer of the facility owner, Savage Coal Service Corporation. The company wanted coal separation so that each customer could store, handle, and transport different grades of coal

The Solution

Because of the inherent strength, flexibility, and low uniform bearing pressures, Reinforced Earth was considered the ideal solution to the owner's seismic considerations and poor foundation. The structures were built using sloping precast facings cast at an angle of 57-degrees. Conventional high adherence galvanized ribbed strips were used as soil reinforcement.

The Advantages

The Reinforced Earth Company designers faced two major challenges. First, the facility was to be constructed in a Seismic Risk zone with a rating of 3 and 4 therefore having the potential for major damage from ground shaking during a seismic event. The largest peak bedrock acceleration at about 0.33 g - representing a peak ground surface acceleration of approximately 0.22 g - could result at the site. Because of the proximity of significant faults, finite element analyses of seismic earthquake forces were performed to determine design forces. The second major challenge involved presence of alluvial soils that are native to the region. The soils comprised predominantly low plasticity sandy silts and clean sands, materials not considered suitable for support of structures with severe base loadings which could be subjected to significant seismic action.

RECo #2626

